773 Stress Echocardiography: Gender, Methods, Prognosis

Wednesday, March 19, 1997, 8:30 a.m.–10:00 a.m.
Anaheim Convention Center, Room B1

8:30

773-1 Accuracy of Dobutamine Stress Echocardiography for the Prediction of Coronary Artery Disease in a Large Unselected Female Patient Population

R. Yeleti, M. Al-Dalli, P. Brenneman, D.S. Segar, H. Feigenbaum, S.G. Sawada. *Krannert Institute of Cardiology, Indiana University. Indianapolis, IN, USA*

Due to the reduced specificity of stress ECG for the detection of coronary artery disease (CAD) in females, concomitant myocardial imaging is routinely used. The accuracy of dobutamine stress echo (DSE) in females has not been established. *Methods:* Data on 1147 women undergoing DSE was reviewed. DSE was considered positive in the presence of a resting wall motion abnormality (WMA) or a stress induced WMA. Significant CAD was defined as luminal narrowing of ≥50% in a major epicardial coronary artery. *Results:* Of the 1147 females evaluated, 206 underwent coronary angiography (CA) within six months of the DSE. There were 453 females who had a normal DSE who did not undergo CA. The sensitivity of DSE for predicting CAD was 92% and the specificity was 72%. The specificity was 81% (43/53) in females without baseline WMA. There were ten false positives exams in this group. Of these, seven patients had isolated basal or combined basal/mid inferior segment abnormalities and three had mid lateral or apical WMA. All three patients with lateral/apical WMA had 30%–40% narrowing of the left anterior descending artery. Four of the ten had suboptimal echocardiograpic images. *Conclusions:* DSE has a clinically useful level of sensitivity and specificity in women in spite of referral bias. False positive exams may occur in patients with limited inferior WMA and in patients with mild CAD.

8:45

773-2 Exercise Echocardiography Provides Prognostic Data Incremental to Clinical Evaluation and Exercise ECG in Women

S. Heupler, A. Lobo, R. Mehta, K. Arheart, T. Marwick. *Cleveland Clinic Foundation, Cleveland, OH, USA*

Exercise echo (ExE) accurately identifies coronary artery disease in women. To determine whether ExE offers incremental prognostic value, we followed 550 consecutive women who underwent symptom limited ExE between 1989 and 1993. Abnormal ExECG was defined by ST depression (ST+) > 0.1 mV, ischemia (ISC) by new or worse wall motion abnormality, and scar (SCR) by a-/dyskinesis at rest. After exclusion of 6 pts with uninterpretable studies (1%), and 43 pts (8%) lost to follow-up, 501 pts (age 56 ± 11 y) were followed over 41 ± 9 m for cardiac death, infarction or late revascularization (RVS).

Results: Pts reached 92 ± 9% predicted max heart rate, with exercise capacity 7 ± 2 METS. ST+ was present in 68 of 415 pts with interpretable ECG (16%). ExE was normal (N) in 407 (81%), positive for ISC in 64 (12%) and SCR only in 30 (6%). No events occurred in 447 (89%) and 13 underwent primary RVS (within 3 m of the stress test). Cardiac events occurred in 41 pts (8%); predictive value of positive (ISC or SCR) or negative ExE exceeded that of equivalent ExECG;

	EXE–	ST–	p	EXE+	ST+	p
Total events (n = 41)	3%	6%	0.04	30%	13%	< 0.01
Cardiac death (n = 17)	1.5%	2%	NS	12%	3%	0.04

In a Cox model, ISC (RR 5.8, p < 0.0001), SCR (RR 3.3, p = 0.0007), and % predicted heartrate (RR 0.80 per increment of 10%, p = 0.04) but not ST+ were independent predictors of outcome. Global chi-square of sequential Cox models of clinical (20), stress (26) and ExE (60) data showed incremental predictive power. *Conclusion:* In this large cohort of women with extended follow-up, ExE provided key prognostic information beyond clinical and ExECG data.

9:00

773-3 Lower Rate of False Positive Exams in Young Women With Dobutamine Stress Echocardiography Compared to Persantine Thallium

V. Emani, S. Devries. *University of Illinois, Chicago, IL, USA*

Introduction: The evaluation for coronary disease in women is particularly difficult due to the frequent occurrence of false positive stress tests. Addition of an imaging study-either echocardiography or nuclear scintigraphy- is frequently recommended in order to decrease the likelihood of a misleading result.

Method: In order to compare the false positive rate in women undergoing persantine thallium (P Thal) and dobutamine stress echocardiography (DSE), 137 consecutive women studied with either P Thal or DSE and subsequent coronary angiography were studied. A false positive imaging study was defined as one with evidence of a reversible abnormality with stress associated with an angiogram with a maximal diameter stenosis of <50%.

Results: The overall rate of false positive studies (as a percentage of total studies) was significantly greater for P Thal 37/75 = *49%*) than for DSE (15/62 = *24%*), p = 0.005. P Thal had a higher false positive rate in women <55 (18/27 = *67%*) compared to those >55 (19/48 = *40%*), p < 0.05. Alternatively, the false positive rate with DSE was similar in women <55 (5/22 = *23%*) and >55 (10/40 = 25%), p = NS.

Summary: The rate of false positive studies in women was significantly higher with P Thal than DSE, particularly in women <55.

Conclusion: The value of DSE testing compared to P Thal in women is enhanced by the finding with DSE of an equally low false positive rate in pre and post menopausal age groups. Reduction of false positive stress tests with DSE in younger women has the potential to lower the cost of diagnostic testing and reduce unnecessary invasive procedures.

9:15

773-4 Quantification of Myocardial Wall Thickening, Doppler Stroke Volumes and Ejection Fraction in Normal Subjects During Dobutamme Stress Echocardiography

A.F. Sonel, W. Maxted, C. Rimmerman, D. Segar, H. Feigenbaum, N. Fineberg, S. Sawada. *Krannert Institute of Cardiology, Indianapolis, Indiana, USA*

The high quality of echocardiograms performed during dobutamine stress echocardiography (DSE) may permit quantitative evaluation of percent wall thickening (PWT), ejection fraction (EF), and spectral Doppler derived stroke volumes (SV). We studied 10 normal subjects (Mean age 26, 7 men, 3 women). Dobutamine was infused up to 40 μg/kg/min and 1 mg supplemental atropine was given at peak dose. Measurements for PWT, EF and SV were made using M-mode of LV, apical 2D and left ventricular outflow tract Doppler recordings, respectively, at each stage. By repeated measures ANOVA, the first significant increase in mean PWT was seen at 5 μg/kg/min for the posterior wall and at 20 μg/kg/min for the septum (p < 0.001). The only significant increase in EF was seen at 10 μg/kg/min (p < 0.001). Doppler SV showed significant increases at both 5 and 10 μg/kg/min (p < 0.001). There were no significant increases in mean EF and SV after 10 μg/kg/min and in PWT after 20 μg/kg/min. The mean values for EF and SV at rest and peak dose were 57.6 ± 3.6%, 93.0 ± 16.8 ml and 71 ± 5.3%, 148.9 ± 26 ml, respectively. A decrease of PWT, EF and SV was not seen at any stage during DSE.

Conclusions: Quantification of EF, PWT, and SV is attainable during DSE. Peak levels for these parameters are achieved by 20 μg/kg/min and failure to increase further may not represent an abnormal response in patients undergoing DSE. Decrease of these parameters were not seen and should be considered abnormal.

9:30

773-5 Exercise Echocardiography: Treadmill Versus Supine Bicycle

M.F. Stoddard, R.A. Longaker, J. Johnstone, S. Dillon. *University of Louisville, Louisville, KY, USA*

Exercise (Ex) stress echocardiography (SE) has emerged as a valuable diagnostic method for coronary artery disease (CAD). It is unknown if the method of exercise significantly influences the accuracy of SE. Thus, 50 pts (49 M/1 F) mean age 59 ± 10 yrs with normal (n = 37) and abnormal (n = 13) rest LV function underwent both supine bicycle (Bike) and treadmill (ETT) SE 1 day prior to cardiac cath, indicated on the basis of symptoms. Standard 2D echo images (Cineloop and video) were done at rest, peak and immediately post during Bike SE (25 watt incremental 3 min stages) and at rest and immediately post during ETT SE (Bruce protocol). The order of Bike and ETT SE were randomized and separated by at least 4 hrs. CAD criteria was ≥50% diameter stenosis. *Results:* ETT SE compared to Bike SE was more sensitive for detection of CAD (90% vs 71%, p < 0.05) due to better sensitivity (Sens) for single vessel CAD (81% vs 56%, p < 0.05) (table). Specificity (Spec) did not differ.